ric P. Palkovacs
ale University, New Haven, Connecticut

004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

vestigating the Ecological Impacts of Anadromous Alewife Restoration in New England

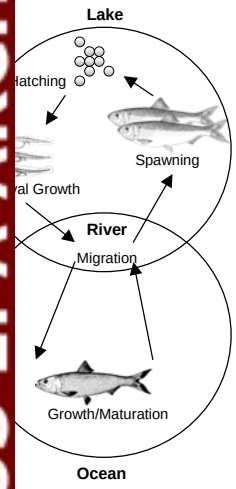
nvironmental Issue

removal and fish ladder construction projects are rway on many coastal New England rivers and streams

se projects aim to restore anadromous (migratory) fish es, including the historically abundant alewife

ored access to historical spawning habitat will have plored ecological consequences

potential hurdle to anadromous alewife restoration is the nce of landlocked alewife populations in many lakes



Anadromous Alewife Life Cycle

•Spring migrations bring adults from the Atlantic Ocean into coastal rivers and lakes where spawning takes place

•Larvae feed on zooplankton in freshwater and grow throughout the summer

•In early fall, the juveniles migrate to the ocean where they grow to sexual maturity in 3-4 years

•Mature adults return to their natal streams to spawn

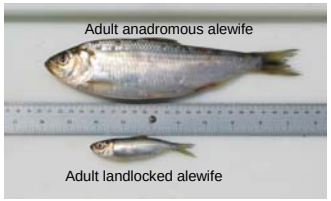
•Spawners **import marine nutrients** into freshwater systems and juveniles may **shape zooplankton assemblages** through intense predation

Abstract

Populations of anadromous and landlocked alewives (*Alosa pseudoharengus*) will be studied in order to understand the evolutionary origin and ecological consequences of life history variation in this species. From a management perspective, this study aims to understand the implications of anadromous alewife restoration at both the population and community levels.

The Ecological Consequences of Life History Variation

•Alewives express anadromous and landlocked life histories. Whereas anadromous alewives migrate between fresh and salt water, landlocked alewives live their entire lives in freshwater lakes and are important pelagic (open water) predators of zooplankton. Because of differences in predation pressure and resource availability, landlocked alewives are smaller and younger at maturity than anadromous alewives.



Freshwater zooplankton are prey for landlocked alewives and for juvenile anadromous alewives. Alewife predation can shift zooplankton dominance from large bodied species such as *Daphnia* (top) to small bodied species such as *Bosmina* (bottom).

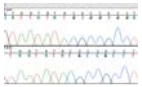
Key Questions:
•Do anadromous and landlocked alewives differ in their ecological roles?
•What changes will anadromous alewife recovery bring about in lakes with/without landlocked alewives?
•Will landlocked alewife populations be a barrier to anadromous alewife recovery?

Scientific Approach

1. Growth, Survival, Reproduction

•Anadromous and landlocked populations are sampled to estimate population densities, age-specific survival and reproductive rates, and individual growth rates. These population parameters are input into a model that will be used to predict population growth or decline under different recovery scenarios.

2. Genetic and Morphological Variation



•Genetic and morphological differences between populations are estimated. These differences may underlie any ecological differences between the two life histories and are useful for inferring the evolutionary origin of landlocked populations.

3. Experimental Manipulations

•The presence of anadromous and landlocked juveniles are manipulated in lake mesocosm experiments which examine the ecological effects of anadromous alewife restoration. Alewife growth and survival, zooplankton diversity, and algae abundance are measured over the duration of the experiment.

This fellow is sponsored by EPA's STAR or Greater Research Opportunities (GRO) Program.